

UECM1404 Theory of Interest Tutorial 5**TUTORIAL 5****UNIVERSITI TUNKU ABDUL RAHMAN**

Faculty:	FES	Unit Code:	UECM1404
Course:	AS, FM	Unit Title:	Theory of Interest
Year:	1	Tutor:	Dr Chin Jia Hou
Session:	202206		

- Q1. A loan of 6000 at a nominal rate of 12% convertible monthly is to be repaid by six monthly payments with the first payment due at the end of 1 month. The first three are x each, and the final three payments are $3x$ each. Determine the sum of the principal repaid in the third payment and the interest paid in the fifth payment.

501.64

- Q2. Sam borrows L for n years at an annual effective rate of 4%, to be repaid with equal payments at the end of each year. The outstanding balance at the end of the 7th year is 1807.24 and at the end of the 8th year is 603.46. Calculate the principal repaid in the first payment.

914.77

- Q3. Steven have a 30-year 190,000 mortgage with an 9% interest rate convertible monthly. Payments are made at the end of the month. Immediate after the 120th payment, he refinance the mortgage. The interest rate is reduced to 7.5%, convertible monthly, and the term is reduced to 20 years (so there are 10 years of payments remaining). He also make an additional payment of 25,333 at the time of refinancing. Calculate his new monthly payment.

1,716.23

- Q4. You took a mortgage loan of 300,000 on January 1, 2021 which required to pay 45 equal annual payments at 10% interest with the first payment due on January 1, 2022. The bank sold your mortgage to an investor immediately after receiving your 9th payment. The yield to the investor is 7%. Determine the bank's overall return on its investment.

0.1229

- Q5. A loan is being amortized by means of level monthly payments at an annual effective interest rate of 6%. the amount of principal repaid in the 11th payment is 3000 and the amount of principal repaid in the t -th payment is 10500. Calculate t .

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Q6. A loan of 128,000 is being repaid by 24 equal annual installments made at the end of each year at 6% interest effective annually. Immediately after the 9-th payment, the loan is renegotiated as follows:

- The borrower will make 15 annual payments of K to repay the loan, with the first payment three years from the date of renegotiation.
- The interest rate is changed to 7.5% effective annually.

Calculate K .

12,967.91

Q7. A loan is to be repaid by annual installments of X at the end of each year for 10 years. You are given:

- the total principal repaid in the first 3 years is 272.92; and
- the total principal repaid in the last 3 years is 464.72.

Calculate then total amount of interest paid during the life of the loan.

586.72

Q8. A loan of 46,000 is being repaid by a 45-year increasing annuity-immediate. The initial payment is K , and each subsequent payment is K larger than the preceding payment. Determine the principal outstanding immediately after the 8th payment, using an annual effective interest rate of 8%.

71,393

Q9. Don takes out a 14-year loan of L , which repays with annual payments at the end of each year using the amortization method. Interest on the loan is charged at an annual effective rate of i . Don repays the loan with a decreasing series of payments. He repays 1,400 in year one, 1,300 in year two, 1,200 in year three, ..., and 100 in year 14. The amount of principal repaid in year three is equal to 767.07. Calculate L .

7,298.17

Q10. A loan of 900,000 is being amortized with payments at the end of each year for 18 years. If $v^9 = 0.852$, find the amount of principal repaid in the first 9 years. Answer to nearest dollars.

414,039

Q11. A 18-year loan of 18,000 is to be repaid with payments to the lender of 1,800 at the end each year and deposits of X at the end of each year into a sinking fund. Interest on the loan is charged at and 10% annual effective rate. The sinking fund annual effective interest rate is 4%. Calculate X .

701.88

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Q12. Julie borrows 20,000 at an effective annual interest rate of 12%. She has the following option for repayment:

- (a) Annual amortization method, with payments made at year-end for 12 years
- (b) Paying annual interest at year-end and building up a sinking fund (earning an effective annual interest rate of 6%), by making level payments at year-end, to pay off the loan at the end of 12 years.

Determine the absolute value of the difference between the total annual outlay under option (a) and the total annual outlay under option (b).

356.8

Q13. John borrows 10,000 for 18 years and uses a sinking fund to repay the principal. The sinking fund deposits earn an annual effective interest rate of 5%. The total required payment for both the interest and sinking fund deposit at the end of each year is 66441. Calculate the annual effective interest rate(in %) charged on the loan.

62.89

Q14. Barbara borrowed 19,000 from a bank and agreed to make interest payments every 3 months on the loan at an annual effective rate of 4%. She will repay the principal at the end of 13 years. At the same time the interest payment is made, Barbara also makes deposits of X into a fund earning interest at a nominal annual rate of 2% convertible quarterly. At the end of 13 years, Barbara has exactly 19,000 in the fund to repay the loan. Determine Barbara's total payment every 3 months.

508.95

Q15. A 10-year 18,000 loan is to be repaid with payments at the end of each year consisting of interest on the loan and a sinking fund deposit. Interest on the loan is charged at a 12% annual effective rate. The sinking fund's annual effective interest rate is 8%. However, beginning in the sixth year, the annual effective interest rate on the sinking fund's unexpectedly drops to 6%. As a result the annual payment to the sinking fund is then increased by X . Calculate X .

220.12